

In the Claims:

1. (Currently Amended) A method for ~~obtaining~~ determining torques to be applied to joints of a leg of a biped walking system, comprising the steps of:

determining which leg or legs are in contact with the ground;

~~obtaining~~ determining the vertical component of a ground reaction force acting on the leg, based on which leg or legs are in contact with the ground;

~~obtaining~~ determining a point of application of the ground reaction force;

calculating a moment of the ground reaction force based on the vertical component of the ground reaction force and the point of application of the ground reaction force;

calculating ~~obtaining~~ moments acting around the joints of the leg, using the moment of the ground reaction force, the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction force, the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity; and

~~obtaining~~ determining the torques to be applied to the joints of the leg, based on the moments acting around the joints of the leg.

2. (Original) A method according to claim 1, wherein in a single-support mode the vertical component of the ground reaction force acting on the leg is assumed to be $M \cdot g$ and in a double-support mode the vertical component of the ground reaction force acting on each of the legs is assumed to be $(1/2) \cdot M \cdot g$, where M is a weight of a person and g is the acceleration of gravity.

3. (Original) A method according to claim 1 or 2, wherein in the step of determining which leg or legs are in contact with the ground, the determination is made based on a value of the vertical component of acceleration measured on the body.

4. (Original) A method according to claim 1 or 2, in the step of determining which leg or legs are in contact with the ground, the determination is made using a sensor.

5. (Currently Amended) A method according to ~~any one of claim 1 to 4~~, wherein in the step of ~~obtaining~~ determining a point of application of the ground reaction force, the point is ~~obtained~~ determined based on the attitude of the leg and a location of the center of gravity of the body.

6. (Currently Amended) A method according to claim 5, wherein in the step of ~~obtaining~~ determining a point of application of the ground reaction force, the point is ~~obtained~~ determined further using information from a sensor.

7. (Currently Amended) A method according to ~~any one of claim 1 to 6~~, wherein in the step of ~~obtaining~~ determining moments acting around the joints of the leg, at first the vertical component of a force acting on and a moment acting around the knee joint of the shin, are ~~obtained~~ determined using the vertical component of the ground reaction force acting on the shin at the point of application of the ground reaction force and a term of the acceleration of gravity and without using the horizontal component of the ground reaction force and a term of acceleration except the term of the acceleration of gravity, and then the vertical component of a force acting on and a moment acting around the hip joint of the thigh, are ~~obtained~~ determined using the vertical component of a force acting on and a moment acting around the knee joint of the thigh and a term of the acceleration of gravity and without using the horizontal component of the horizontal component of the force acting on the knee joint and a term of acceleration except the term of the acceleration of gravity.

8. (Currently Amended) A method for ~~obtaining~~ determining moments acting around joints of a leg of a biped walking system, comprising the steps of:

- determining which leg or legs are in contact with the ground;
- ~~obtaining~~ determining the vertical component of a ground reaction force acting on the leg, based on which leg or legs are in contact with the ground;
- ~~obtaining~~ determining a point of application of the ground reaction force;

and

- calculating a moment of the ground reaction force based on the vertical component of the ground reaction force and the point of application of the ground reaction force; and
- calculating ~~obtaining~~ the moments acting around the joints of the leg, using the moment of the ground reaction force, the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction force, the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity.

9. (Currently Amended) A processor for ~~obtaining~~ determining torques to be applied to joints of a leg of a biped walking system, the processor being

operable in association with angular sensors on the joints and at least one sensor set on the body of the biped walking system, wherein the processor is configured to perform the steps of:

determining which leg or legs are in contact with the ground, using information from the at least one sensor set on the body;

~~obtaining~~ determining an attitude of the leg, using information from the angular sensors;

~~obtaining~~ determining a location of the center of gravity of the whole body including the leg;

~~obtaining~~ determining the vertical component of a ground reaction force acting on the leg, based on which leg or legs are in contact with the ground;

~~obtaining~~ determining a point of application of the ground reaction force, using the attitude of the leg and the location of the center of gravity of the whole body;

calculating a moment of the ground reaction force based on the vertical component of the ground reaction force and the point of application of the ground reaction force;

calculating ~~obtaining~~ moments acting around the joints of the leg, using the moment of the ground reaction force, the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction

~~force~~, the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity; and

~~obtaining~~ determining the torques to be applied to the joints of the leg, based on the moments acting around the joints of the leg.

10. (Currently Amended) A processor for ~~obtaining~~ determining torques to be applied to joints of a leg of a biped walking system, the processor being operable in association with angular sensors on the joints, at least one sensor set on the body of the biped walking system and at least one sensor set on the leg, wherein the processor is configured to perform the steps of:

determining which leg or legs are in contact with the ground, using information from the at least one sensor set on the leg;

~~obtaining~~ determining an attitude of the leg, using information from the angular sensors;

~~obtaining~~ determining a location of the center of gravity of the whole body including the leg;

~~obtaining~~ determining the vertical component of acceleration of the center of gravity of the whole body including the leg, using information from the at least one sensor set on the body;

~~obtaining~~ determining the vertical component of a ground reaction force acting on the leg, based on which leg or legs are in contact with the ground, the attitude of the leg, the location of the center of gravity of the whole body and the vertical component of acceleration of the center of gravity of the whole body;

~~obtaining~~ determining a point of application of the ground reaction force, using the attitude of the leg and the location of the center of gravity of the whole body;

calculating a moment of the ground reaction force based on the vertical component of the ground reaction force and the point of application of the ground reaction force;

calculating ~~obtaining~~ moments acting around the joints of the leg, using the moment of the ground reaction force, the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction force, the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity; and

~~obtaining~~ determining the torques to be applied to the joints of the leg,
based on the moments acting around the joints of the leg.

11. (Currently Amended) A processor for ~~obtaining~~ determining moments acting around joints of a leg of a biped walking system, the processor being operable in association with angular sensors on the joints, at least one sensor set on the body of the biped walking system, wherein the processor is configured to perform the steps of:

determining which leg or legs are in contact with the ground, using information from the at least one sensor set on the body;

~~obtaining~~ determining an attitude of the leg, using information from the angular sensors;

~~obtaining~~ determining a location of the center of gravity of the whole body including the leg;

~~obtaining~~ determining the vertical component of acceleration of the center of gravity of the whole body including the leg, using information from the at least one sensor set on the body;

~~obtaining~~ determining the vertical component of a ground reaction force acting on the leg, based on which leg or legs are in contact with the ground;

~~obtaining~~ determining a point of application of the ground reaction force, using the attitude of the leg and the location of the center of gravity of the whole body; and

calculating a moment of the ground reaction force based on the vertical component of the ground reaction force and the point of application of the ground reaction force;

calculating ~~obtaining~~ the moments acting around the joints of the leg, using the moment of the ground reaction force, ~~the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction force,~~ the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity.

12. (Currently Amended) A processor for ~~obtaining~~ determining moments acting around joints of a leg of a biped walking system, the processor being operable in association with angular sensors on the joints, at least one sensor set on the body of the biped walking system and at least one sensor set on the leg, wherein the processor is configured to perform the steps of:

determining which leg or legs are in contact with the ground, using information from the at least one sensor set on the leg;

~~obtaining~~ determining an attitude of the leg, using information from the angular sensors;

~~obtaining~~ determining a location of the center of gravity of the whole body including the leg;

~~obtaining~~ determining the vertical component of acceleration of the center of gravity of the whole body including the leg, using information from the at least one accelerometer;

~~obtaining~~ determining the vertical component of a ground reaction force acting on the leg, based on which leg or legs are in contact with the ground;

~~obtaining~~ determining a point of application of the ground reaction force, using the attitude of the leg and the location of the center of gravity of the whole body; and

calculating a moment of the ground reaction force based on the vertical component of the ground reaction force and the point of application of the ground reaction force;

calculating ~~obtaining~~ the moments acting around the joints of the leg, using the moment of the ground reaction force, ~~the vertical component of the ground reaction force acting on the leg at the point of application of the ground reaction~~

~~force~~, the vertical components of forces acting on the joints of the leg and a term of the acceleration of gravity and without using the horizontal components of the forces acting on the joints of the leg and a term of acceleration except the term of the acceleration of gravity.